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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

24 June 1974

MEMORANDUM FOR: The Director of Central Intelligence

SUBJECT : MILITARY THOUGHT (USSR): Engineer Support in Negotiating a Nuclear Mine Belt

1. The enclosed Intelligence Information Special Report is part of a series now in preparation based on the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article dwells on engineer measures, including reconnaissance, demolition of mines and road construction, in support of ground forces negotiating a nuclear mine belt. The author stresses the importance of timing and the problem of radiation among factors affecting engineer operations. This article appeared in Issue No. 1 (86) for 1969.

2. Because the source of this report is extremely sensitive, this document should be handled on a strict need-to-know basis within recipient agencies. For ease of reference, reports from this publication have been assigned the [redacted] Codeword [redacted]

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William E. Nelson
Deputy Director for Operations

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Intelligence Information Special Report

COUNTRY USSR

FIRDB – 312/02281-74

DATE OF INFO. Early 1969

DATE 24 June 1974

SUBJECT

MILITARY THOUGHT (USSR): Engineer Support in Negotiating a Nuclear Mine Belt

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 1 (86) for 1969 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". The author of this article, Colonel M. Tolchinskiy, discusses engineer measures to support ground forces negotiating a nuclear mine belt. The article dwells on reconnaissance and demolition procedures, and the personnel and equipment required for road construction in detonated areas. The importance of timing to coordinate engineer support with troop moves is stressed, as is the problem of radiation levels.

End of Summary

50X1-HUM

Comment:

There is no information in available reference materials which can be firmly associated with the author. The SECRET version of Military Thought was published three times annually and was distributed down to the level of division commander. It reportedly ceased publication at the end of 1970.

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Engineer Support in Negotiating a Nuclear Mine Belt

by
Colonel M. Tolchinskiy

The requirement to negotiate nuclear mine obstacles, especially an enemy nuclear mine belt, is one of the probable features of both a combined-arms and a tank army offensive operation involving the use of nuclear weapons. As experience in military exercises and theoretical research have shown, engineer support measures play an essential role in the successful negotiation of this new type of obstacle.

In this article we shall examine questions concerning the effectiveness of nuclear mine obstacles, reconnaissance support, the seizure, deactivation, and destruction of nuclear land mines and control posts by explosion, and also the organization of the preparation of routes through a detonated nuclear mine belt.

The effectiveness of nuclear mine obstacles, from the enemy point of view, should be judged mainly by the amount of time needed by attacking troops to negotiate them. Of course, it can be gauged also by losses inflicted on troops by the casualty-producing factors of nuclear land mine bursts. But this, in our view, is not decisive to the enemy. His basic goal is, with the aid of such obstacles, to delay large forces of attacking troops for an extended time period, to create the conditions for destroying them with all kinds of weapons, and also to gain time to regroup and build up his own forces.

The total amount of time expended by troops in negotiating a detonated nuclear mine belt is the sum of the time spent waiting for high radiation levels to drop to the limit at which the subunits assigned to clear and prepare the routes will not receive doses of radiation above the level tolerable (or established) for one-time radiation, the time spent on reconnaissance and preparation of routes, and the time taken to move across the belt and the contamination zone that has formed.

These elements of time in turn depend on the density of nuclear land mines in the belt, their yield, the nature of the terrain, wind direction and speed, capabilities for clearing and preparing routes, the degree to which the troops are protected against radiation, and other factors.

To gain some idea as to how long troops could be delayed by a detonated nuclear mine belt, the Engineering Department of the Military

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Order of Lenin Red Banner Academy of Tank Troops i/n Marshal of the Soviet Union R. Ya. Malinovskiy, conducted the following research.

Three typical terrain segments were chosen on maps of the eastern part of the Federal Republic of Germany, where the enemy plans to create a nuclear mine belt: one with unbroken terrain, one of average ruggedness, and one mountainous and wooded, each 20 kilometers wide, which approximately corresponds to the offensive zone of a tank division. In each of them nuclear land mines supposedly were laid at densities of 0.35, 0.5 and 0.75, and one land mine per kilometer of the belt. In order for the results to be comparable, the relative yields of the nuclear land mines were assumed to be identical: in all variants one-third of the land mines were equal to 47 kilotons of TNT, one-third to 28 to 30 kilotons, and one-third up to 11 kilotons. Average wind direction was assumed to be toward the attacking troops at an angle of 45 degrees to their axis of movement. The locations for emplacing the land mines were determined by calculating where a given number of them could produce the greatest amount of destruction.

This format for a nuclear mine belt differs from those cited in the periodical military press. Engineer Colonel Yu. Dorofeyev, in particular, points out in his article* that in terrain of average ruggedness the density of nuclear land mines will be not more than 0.5 per kilometer of the belt. And 80 to 90 percent of the total number will have a yield of up to 10 kilotons.

We believe that when creating powerful nuclear mine obstacles, the enemy will not be limited to a density of 0.5 land mines per kilometer of the belt, since he possesses great capabilities in this area. Thus, in a defensive zone of an army corps of the USA, if the pits are prepared in advance, a nuclear mine belt with a density of 0.8 to 1 land mine or more per kilometer can be created in 10 to 12 hours.

Nor, in our view, should we believe that the yield of most land mines will not exceed 10 kilotons. The use of these land mines at a density of 0.3 to 0.5 will not make it possible to create wide interconnecting barriers and a solid zone of radioactive contamination of the terrain with high levels of radiation, and the attacking forces will be able to bypass individual centers of destruction. Therefore we should expect a large number of land mines with yields of 30 and 47 kilotons to be present in an enemy nuclear mine belt.

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* Collection of Articles of the Journal "Military Thought", No. 3 (85) for 1968.

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The research revealed that when the nuclear land mines exploded, the destruction in unbroken terrain could have covered an area of 18 to 54 square kilometers, constituting 17 to 58 percent of the area of the belt (within which the land mines were emplaced), in average terrain, 19 to 57 square kilometers (15 to 37 percent of the area of the belt), and in mountainous wooded terrain, 20 to 70 square kilometers (17 to 39 percent of the area of the belt). Radioactive Contamination Zone B extended to a depth of 12 to 35 kilometers, and Zone A to a depth of 30 to 70 kilometers.

The average extent of destruction on each of the previously designated 5 or 6 routes in unbroken terrain with a density of 0.5 land mines per kilometer of the belt, was 1.9 kilometers, and with a density of one land mine was 3.9 kilometers. In average terrain it came to 2.6 and 5.4 kilometers respectively, and in mountainous wooded terrain, 3.6 and 6.1 kilometers.

Thus, with an increase in the density of land mines in a nuclear mine belt, and in the degree to which the terrain is rugged, wooded, and built up, the amount of destruction on routes of troop movement also increases.

The nature of obstacle clearing and road or bridge building operations varies according to the contour of the land. Thus, it developed that in unbroken terrain, what was needed mainly was to lay cross-country bypass routes and a few bridges. The need to make passages through the barriers arose only when the density was 0.75 to 1 land mine per kilometer of the belt on three routes out of six. In average terrain there was more work to be done to make passages through the barriers and build bridges. As for mountainous wooded terrain, the extreme ruggedness of the terrain contour and the impossibility of laying bypass routes made it necessary to prepare routes directly through the centers of destruction.

Calculations have shown that the work of clearing away obstacles and building and repairing roads and bridges on each route takes, depending on the density of the land mines in the belt, an average of 1.3 to 6 hours in unbroken terrain, 2 to 11 hours in average terrain, and 9 to 24 hours in mountainous wooded terrain.

Since the centers of destruction and the bypass routes will be located mainly in the zone of dangerous radioactive contamination, subunits assigned to prepare the routes, and also the main forces of first-echelon divisions, will be forced to wait for the high radiation levels to drop to the point at which personnel will not receive more than 50 roentgens, or another predetermined dose, during the work.

TS #205469
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To determine the time needed by the troops to negotiate a detonated nuclear mine belt, a special algorithm and program were developed which were used in making calculations on a Minsk-2 electronic computer. Initial data fed in dealt with the place, yield, and depth of the burst of nuclear land mines, the direction and speed of the wind, and the amount and location of engineer works to be done on each route. The computer then produced data on the time to start work on each route, taking into account the time spent waiting for a drop in radiation, and the time when subunits engaged in clearing obstacles would arrive at the terminal point of the route, including the amount of time it would take to cross the belt. Knowing the moment when these subunits will reach the rear boundary of the nuclear mine belt, it is possible also to compute the time it will take the troops to negotiate it, since the main forces of first-echelon divisions must overtake these subunits when the latter are completing obstacle-clearing operations on the route.

The calculations produced an interesting fact. It developed that the time spent waiting for a drop in high radiation levels, and the total time needed to negotiate a nuclear mine belt along various routes within the offensive zone of a division, differ substantially from each other. Thus, in the area of average terrain with a density of 0.5 land mines per kilometer, the time needed to negotiate the belt along Route No. 1 was about 6 hours, Routes 3 and 4--9 to 10 hours, and Routes 2 and 5--over 18 hours. Consequently, in a number of cases it is possible to decide against preparing all previously designated routes, and prepare only those requiring a lesser expenditure of time.

The average overall time troops require to negotiate a detonated nuclear mine belt is shown in the table. It is based on the assumption that the personnel of subunits engaged in preparing routes are in vehicles with a radiation attenuation factor equal to 10. When working in vehicles with less protection, the time required to negotiate the belt will increase. The data cited in the table pertain to terrain segments with large wooded areas, that are heavily built up, and have an extensive network of roads. Under other conditions they could change in one direction or another. However, on the whole these data make it possible, in our view, to judge the approximate time the troops require to negotiate a detonated nuclear mine belt.

(See Table on following page)

Average Time Troops Require to Negotiate a Detonated Nuclear Mine Belt

Density of land mines in the belt per 1 km.	Average time to prepare routes through the nuclear mine belt	Time needed to move across the belt	Average time spent waiting for a drop in high levels of radiation	Total average time needed for troops to negotiate a detonated nuclear mine belt
		On Unbroken Terrain		
0.35	1 hour 15 m.	2 hr. 8 m.	2 hr. 19 m.	5 hours 42 m.
0.5	1 hour 15 m.	2 hr. 33 m.	5 hr. 12 m.	9 hours 00 m.
0.75	4 hours 30 m.	2 hr. 40 m.	11 hr. 39 m.	18 hours 49 m.
1.0	5 hours 40 m.	2 hr. 50 m.	17 hr. 20 m.	25 hours 50 m.
		On Terrain of Average Ruggedness		
0.35	1 hour 40 m.	2 hr. 08 m.	2 hr. 06 m.	5 hours 54 m.
0.5	3 hours 24 m.	2 hr. 10 m.	7 hr. 02 m.	12 hours 36 m.
0.75	6 hours 36 m.	2 hr. 53 m.	24 hr. 31 m.	34 hours 00 m.
1:0	11 hours 20 m.	2 hr. 57 m.	33 hr. 32 m.	47 hours 49 m.
		In Mountainous Wooded Terrain		
0.35	8 hours 35 m.	2 hr. 25 m.	167 hours	178 hours
0.5	12 hours 30 m.	2 hr. 40 m.	314 hours	329 hours
0.75	16 hours 20 m.	3 hr. 35 m.	374 hours	394 hours
1.0	23 hours 35 m.	4 hr. 30 m.	543 hours	571 hours - 2 wks

Thus, from data obtained on the combat effectiveness of a nuclear mine belt, we may conclude that this type of obstacle is capable of substantially delaying an advance of attacking troops. Thus, a major problem here is to find methods of reconnoitering, seizing, deactivating, and destroying nuclear land mines and detonation control points.

Support of these operations while troops are negotiating a nuclear mine belt will constitute the first stage of engineer measures. In the second stage, in the event of complete or partial enemy detonation of a nuclear mine belt, reconnaissance, and the clearing and preparation of routes for moving the main forces are organized. In this connection, engineer units and subunits in an army and in divisions must be allocated in such a way that some of them support reconnaissance, seizure, and deactivation of nuclear land mines, while others are in readiness for reconnaissance and preparation of routes for the movement of the main forces.

We know that all forms of reconnaissance, including engineer reconnaissance, are assigned to obtain data on a nuclear mine belt. However, because the enemy carefully protects the main elements in this belt, independent operations by engineer reconnaissance subunits will be made extremely difficult. It therefore is advisable to include reconnaissance sappers in deep reconnaissance groups and in reconnaissance groups and patrols. From their various revealing features, reconnaissance sappers have to determine the places where nuclear land mines have been emplaced and the location of detonation control points, and ascertain the nature of barriers and obstacles protecting them, possible routes for bypassing them, and the nature of the engineer preparation of security positions and detonation control points. In those cases in which reconnaissance groups are able to seize the site of an emplaced nuclear land mine, reconnaissance sappers pinpoint the location of the land mine itself, and take part in deactivating and destroying it. In addition, they assist reconnaissance subunits in negotiating obstacles.

In order to fulfil these tasks, each reconnaissance group or patrol must include 2 or 3 reconnaissance sappers with the necessary means (mine detector, land mine detector, explosive charges and tool set). The overall requirement in engineer subunits for reconnoitering a nuclear mine belt is 2 to 3 platoons for a first-echelon division, and 2 to 3 reconnaissance sapper companies for an army as a whole (with three divisions in the first echelon). This calculation is based on a density of up to one land mine per kilometer of the belt and does not include the reconnaissance sappers allocated for reconnaissance of the routes of troop movement after the blowing up of these obstacles.

The task of capturing and destroying nuclear land mines and detonation control points is given to forward detachments, from which seizure and destruction groups are allocated.

In most of the military exercises, in order to achieve more efficient distribution of tasks and more convenient control, the group for the seizure and destruction of nuclear land mines was divided into a seizure and support subgroup and a destruction subgroup. The first of these usually was the stronger, destroyed the immediate protection, seized the land mine site, and supported the operations of the destruction subgroup. The latter consisted of specialized sappers and dosimeter monitors, and conducted final reconnaissance of a nuclear land mine site, which it then deactivated or destroyed.

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In order for the seizure subgroup to be able to negotiate the barriers and obstacles protecting the site of an emplaced nuclear land mine, it is advisable to allocate to it 1 or 2 mine-clearing attachments and 1 or 2 tank bulldozers on tanks. The destruction subgroup, in order to be able to determine, with sufficient certainty, in a short time, the exact emplacement of a land mine and prevent its detonation, will require a sapper section equipped with mine detectors, land mine detectors, mine probes, ladders, explosive charges and a tool set.

However, this equipment, and especially the existing means of detecting land mines, is not as effective as it should be. In particular, the land mine detectors make it possible to detect land mines at a depth of only 3 meters at the most, and a mine detector at only 30 to 40 centimeters at the most. Because of the inadequacy of reconnaissance means in the exercises in the Carpathian Military District in 1966, one nuclear land mine was not detected and it took about 1.5 hours to find another. At the exercises in the Southern Group of Forces in 1967, it took about 1 hour to reconnoiter and destroy a land mine. This amount of time does not satisfy modern requirements, since in the interval the enemy can detonate a nuclear land mine that we have seized.

Final reconnaissance and deactivation of a nuclear land mine should not take sappers longer than 20 - 25 minutes, since most land mines have a safety fuse with a delayed-action interval of up to 30 minutes. Obviously we must develop a land mine detector that is effective at a depth of 8 to 10 meters and a distance of several dozen meters. Using two such detectors within the elimination zone, it is possible to detect a land mine rather quickly by using the directional fixing method. Perhaps the land mine detectors should be mounted on a helicopter for this purpose. To prevent the discovered land mine from exploding, the sappers must first sever the wire connecting it to the detonation control point, and also the antenna.

As to recommendations for destroying nuclear land mines by exploding them, this method seems to us to be open to considerable question. Nuclear land mines of types XM55, XM127, and XM129 can, when exploded, produce a partial nuclear burst with a yield of 30 percent of nominal, while an M59 land mine can produce a burst equal to its rated yield. Only XM125 and M50 land mines are safe in this respect. However, the first of these has an explosive charge of about 200 kilograms, which will go off from the detonation when the land mine explodes.

The radius of safe distance for personnel in armored personnel carriers when an XM127 land mine is exploded (30 percent of rated yield) can reach 1.5 to 2 kilometers, while for an M59 land mine it could be 2 to 5 kilometers. Consequently, when destroying these types of land mines by

50X1-HUM

explosive means, it is essential to move personnel a considerable distance away, which requires a great deal of time. In addition, the center of destruction that forms as a result, and the radioactive contamination of the terrain, will hamper the advance of the main forces. Damage to other subunits of the forward detachment also is possible. Therefore, it is advisable to deactivate the XM127 and M59 land mines by moving the explosive device to a safe position. The fact that these land mines are emplaced in pits that are not filled in makes this easier. After the main forces of an army negotiate the belt, these land mines can be turned over to engineer or other special units of the front for dismantling.

For operations when mine density is 0.75 to 1 per kilometer of the belt, the groups for the seizure and destruction of nuclear land mines in a division will have to consist of 2 or 3 engineer-sapper companies, while these groups in an army will have to have 6 to 9 engineer-sapper companies, 60 to 70 mine-clearing tank attachments, 90 to 100 land mine detectors, and other equipment.

In organizing the negotiation of a nuclear mine belt, we should always allow for the fact that the enemy can fully or partially detonate it. In such a situation, reconnaissance will be required, and the routes will have to be cleared and prepared to support the movement of the main forces of an army through the detonated belt. The number of routes depends on the amount of obstacle-clearing and road and bridge-building work, the degree of radioactive contamination of the terrain, and the structure adopted by the troops. It is advisable to move the main forces of divisions in battalion columns. This kind of structure will permit divisions to deploy fairly quickly into combat array to seize the enemy forward defensive line. This will require preparing 4 to 6 routes.

Opinions are sometimes expressed in the press that under these conditions a division must prepare 8 to 12 routes and move along them in company columns. Such proposals are subject to challenge with regard to both the advisability of moving a division in company columns to a depth of 20 to 50 kilometers, and the possibility of allocating a sufficient number of engineer forces and means. If at least one engineer road construction and repair platoon were assigned to prepare a route, then a division would require a total of 4 to 6 engineer road construction and repair companies. But the most it could have would be 2 or 3 such companies: 1 organic and 2 attached for reinforcement.

As has been shown by research and experience gained during training at the academy, the amount of destruction on certain routes can be so extensive that we will have to limit ourselves to preparing only 3 or 4 routes (and sometimes even fewer) per division. For example, in a war game

50X1-HUM

held at the academy in 1967 it was planned to prepare 12 routes for a tank army with 3 divisions in the first echelon. In the offensive zone of 2 of the divisions about 40 percent of the land mines were seized and deactivated, as a result of which two passages, each 10 to 12 kilometers wide, were formed. Two routes were prepared through each of them. In the offensive zone of the third division, as a result of the large amount of destruction and the high levels of radiation, it became necessary to abandon the idea of negotiating the nuclear mine belt and instead commit the division to action in the adjacent sector.

To move an army rocket brigade, surface-to-air missile units reserves (of the second echelon), control posts, and other army units, 2 or 3 army routes must be prepared. To maneuver army troops from one axis to another it is advisable to prepare in advance 3 or 4 routes parallel to the national border at a depth of 30 to 60 kilometers.

Engineer and radiation reconnaissance is organized to spot the most advantageous routes for the main forces. To carry it out, army divisions should have a reserve of forces and means, since there exists a major threat that the reconnaissance subunits acting jointly with the forward detachments and airborne landing forces, will suffer casualties when the enemy detonates the nuclear land mines, and will not be able to furnish timely information about obstacles and destruction on the roads. On each route designated in advance, it will be necessary to send out one reconnaissance group consisting of an officer of a combined-arms headquarters, an officer of the engineer troops, 3 or 4 reconnaissance sappers, and 1 or 2 chemical reconnaissance men. In view of the fact that reconnaissance will be conducted in an area with high levels of radiation and a large amount of destruction, reconnaissance groups should be sent out in helicopters.

On the basis of the data obtained from all types of reconnaissance, the sites of seized, deactivated, and blown up nuclear land mines, centers of destruction, zones of radioactive contamination of the terrain, areas of fires, etc. are plotted on a map. Then the routes are determined, and the time when work on them is to begin and the main forces are to move is calculated. In order to lessen the amount of work and reduce the waiting time of the main forces, routes are chosen which can bypass the centers of destruction by using existing roads or which fall on axes with lower levels of radiation.

The preparation of each route may require 1 or 2 platoons of tanks, up to a platoon of sappers in an armored personnel carrier, 2 to 4 bulldozer tanks, 1 or 2 KMT-5 mine-clearing tank attachments, 2 or 3 bridgelayers, equipment for widening passages in minefields and for marking routes,

TS #205469
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explosive charges, etc. Units varying in size from a platoon to an engineer road construction company may be assigned on axes with lower radiation levels.

During operations in zones with high levels of radiation, personnel may receive the maximum tolerable doses of one-time radiation before completing work on the routes. In such cases they should be replaced by personnel, brought in by helicopter from a previously prepared reserve. For this purpose an army will require 10 to 12 MI-4 helicopters, taken from those being used to reconnoiter routes.

Subunits assigned to prepare the routes will be able to begin work immediately after receiving intelligence data or after the radiation drops to the level at which the personnel would not receive more than the maximum tolerable dose. The relevant data are given in the table cited above.

Before an offensive begins, the main forces of the first-echelon divisions should be stationed outside the probable zone of radioactive contamination of terrain from the detonation of a nuclear mine belt, and not less than about 60 to 80 kilometers from the national border. These units should begin their advance toward the detonated belt at a time that will enable them to overtake the subunits assigned to prepare the routes, at the moment the subunits complete obstacle-clearing and road work. The interval of time between the beginning of movement by these subunits and by the main forces will be approximately equal to the duration of the obstacle-clearing and road work. In the process, the main forces may advance toward the border and cross the detonated nuclear mine belt at a speed close to the average rate of march. They will not stop in places where obstacle-clearing work is going on, where personnel would receive additional doses of radioactivity.

Calculations have shown that the overall requirement of forces and means for engineer support of the negotiation of a nuclear mine belt by an army (with three divisions in the first echelon) is up to 6 tank companies, 16 to 20 engineer-sapper companies, 8 to 10 engineer road construction and repair companies, 3 or 4 engineer bridge-building companies, 80 bulldozer tanks, 80 to 110 mine-clearing tank attachments, up to 40 bridgelayers, and 12 to 15 helicopters. On the basis of the number of engineer troops in an army, it could require an additional three engineer-sapper battalions.

In an army, considerable forces will be engaged in accomplishing the tasks of engineer support of the negotiation of a nuclear mine belt. However, engineer-sapper and engineer road units do not have adequate protection from radiation. This can cause them to take more time to fulfil their assigned tasks. Therefore, in our view, it now is especially

50X1-HUM

important to organize special engineer units of the Reserve of the High Command, intended for qualitative reinforcement of troops w 50X1-HUM are negotiating nuclear mine obstacles.

In this case, it appears to be just as necessary as was organizing the mine-clearing tank regiments and engineer assault brigades which were used to reinforce armies and divisions when breaking through heavily fortified positions during World War II. A study of this question has shown that it is advisable to have obstacle -clearing engineer regiments of the Reserve of the High Command consisting of 3 or 4 battalions, with a view toward reinforcing an army with such a regiment and a first-echelon division with a battalion. Considering that when negotiating a nuclear mine belt, 15 to 20 groups for the seizure and destruction of nuclear land mines can be organized in a division (with at least one sapper-specialist section in each), and 4 routes will have to be prepared, an obstacle-clearing engineer battalion should have 2 companies for the deactivation and destruction of nuclear land mines (with 3 platoons in each) and an obstacle-clearing road company of 4 platoons. A platoon of a company for the deactivation and destruction of nuclear land mines may consist of 3 sections, each with means of reconnoitering and deactivating land mines, and deployed in an engineer combat vehicle. A platoon of an obstacle-clearing road company should have 2 engineer tanks, 2 or 3 tank bridgelayers with spare trusses, and 1 engineer combat vehicle.

To successfully fulfil the task of supporting the negotiation of a nuclear mine belt by troops, obstacle-clearing engineer units must be given new equipment in addition to their existing means (bridgelayers, mine-clearing tank attachments, mine-clearing charges, etc.). The most important new items are mine detectors, engineer tanks, and engineer combat vehicles.

An engineer tank must be equipped with a set of equipment which enables the crew, without getting out of the tank, to successfully perform the work of clearing routes through a detonated nuclear mine belt under conditions of high radioactive contamination of the terrain. This equipment may include a bulldozer attachment for clearing away barriers and piling up dirt, two saws for slicing up the large elements in tree barriers, a mechanical "hand" for pulling barriers apart, and a device for throwing explosive charges. The radiation attenuation factor for personnel in these vehicles should equal 20 to 30.

A combat engineer vehicle is intended mainly for operating in the nuclear land mine seizure and destruction groups. It is supposed to accommodate a sapper section, have a bulldozer attachment for clearing the approach to the emplacement site of a nuclear land mine, a crane for

50X1-HUM

TOP SECRET

removing it from the pit, and a device for sucking dirt out of the pit in those cases in which the land mines are packed in. The radiation attenuation factor should be the same as that of tanks.

At the same time it is essential to reinforce the protective characteristics of road clearers, base vehicles of truck-mounted treadway bridges, and other engineer materiel, in order to raise the effectiveness with which engineer units are used when negotiating nuclear mine obstacles.

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